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COTTAGE POLLUTION CONTROL PROGRAM

KASSHABOG LAKE
OAK LAKE
METHUEN LAKE

COUNTY OF PETERBOROUGH

1976

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COUNTY OF PETERBOROUGH

KASSHABOG LAKE	-	METHUEN TOWNSHIP
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The field work outlined in this report was carried out by the staff of the Peterborough District Office, Municipal & Private Abatement Section.

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COUNTY OF PETERBOROUGH

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PREFACE

Ontario's thousands of beautiful inland lakes provide an abundant resource for recreational enjoyment. To protect the quality of these waters, a delicate environmental balance must be maintained.

A heavy influx of people may subject a lake and its surrounding environment to great stress. Uncontrolled development and imprudent use of our recreational lakes may cause their deterioration and destroy their natural qualities.

The Ontario Ministry of the Environment is attempting to bring some of these stress factors under control by a variety of programs: one of these, the Cottage Pollution Control Program was initiated in 1970 to study the cottage waste disposal problem, to evaluate existing waste disposal systems and to enforce repairs to those found to be unsatisfactory, and to educate the general public in matters pertaining to private sewage disposal.

The Ministry is also carrying on research to improve the knowledge of septic tank operation and the movement of sewage effluent in shallow soils. Alternative methods of private waste disposal are also being evaluated, and every year new toilet systems are brought onto the consumer market after testing by research staff to determine compliance with Ministry requirements.

SUMMARY

The Cottage Pollution Control Program was established to detect and correct faulty private sewage disposal systems of cottages on recreational lakes. The objective of the program is to locate faulty systems, and through cooperation with the owner undertake the required corrective measures.

During the summer of 1976, a total of 855 disposal systems serving cottages in recreation areas were inspected, and were located in Peterborough County on Kasshabog, Oak and Methuen Lakes, all in Methuen Township.

Of all these systems, 15.9% were found to be satisfactory; 35.1% were seriously substandard; 42.2% were nuisances (wash water or toilet wastes); 3.4% were polluting the lake or ground water, and 3.4% were unclassified at the time of inspection. (See Table I)

A total of 218 cottage drinking water samples were collected. Of these, 27% showed presence of coliform bacteria, which are pollution indicators. A further 813 lake water samples were analyzed: 4% of these samples contained sufficient coliform bacteria to render the water unsafe for swimming.

Abatement work was carried out during and after the summer surveys, and by fall, a total of 709 field visits had been made by Abatement staff. Out of 390 problem systems, 190 were corrected by fall. Letters were sent out to 300

cottagers whose systems were Substandard and required upgrading in the future.

The abatement contacts during the summer, correspondence in the fall and winter, together with interviews held in Toronto, Oshawa and Peterborough resulted in more signed agreements for corrections to be done in 1977. Abatement contacts were also to continue in 1977 to visit those cottagers who could not be reached in 1976. Abatement work also continued on cottages inspected during 1974 and 1975; out of 77 cottages with outstanding problems, 22 have corrected their systems, and Agreements have been signed with 55 others to have the work done in 1977.

TABLE I

PRELIMINARY CLASSIFICATION OF SYSTEMS INSPECTED

PETERBOROUGH DISTRICT - 1976

BODY OF WATER	NUMBER OF SYSTEMS INSPECTED	CLASSIFICATION OF SYSTEMS															
		SATISFACTORY		SATISFACTORY PERFORMANCE		SERIOUSLY SUBSTANDARD		NUISANCE (WASH WATER)		NUISANCE (SOLID WASTE)		DIRECT POLLUTER		UNCLASSIFIED TEMPORARILY		UNCLASSIFIED	
		NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
KASSHABOG L.	635	12	1.9	69	10.9	234	36.9	220	34.6	58	9.1	17	2.7	25	3.9	-	-
OAK LAKE	136	22	16.2	21	15.4	37	27.2	39	28.7	10	7.4	6	4.4	1	0.7	-	-
METHUEN LAKE	84	1	1.2	11	13.1	29	34.5	27	32.1	7	8.3	6	7.2	3	3.6	-	-
TOTAL SURVEY	855	35	4.1	101	11.8	300	35.1	286	33.5	75	8.7	29	3.4	29	3.4	-	-

DESIGN OF THE SURVEY

Preparation

During the winter of 1975, Kasshabog, Oak and Methuen Lakes were mapped during a snowmobile reconaissance program carried out by staff from the Peterborough office.

The snowmobile crews counted the total number of establishments on each lake, and described every one hundredth "control" establishment on the shoreline, plotted these cottages on maps and located non-cottage properties such as marinas, camp grounds and lodges.

Data obtained from the snowmobile work, and well as that from Cottage Owners' Associations and other agencies, was used to prepare a work schedule for the student crews.

Prior to the commencement of the summer surveys, a representative from the Program attended the spring meeting of each of the lakes' Cottage Associations. Members were given details of the pending survey, its procedure and format. An explanatory newsletter, prepared by the Ministry was distributed to the executive of each association for mailing to all cottagers with the spring "bulletin". In this way, the greatest possible cross section of cottagers was notified of the survey to follow, whether Association members or non-members, whether attending the meetings or not.

Mid-season meetings, in some cases were also held with

cottagers to explain corrective procedures and progress of the survey.

Detection Surveys

Two crews, composed of two students each, began the survey of each lake by preparing the description log of cottages in which each establishment was systematically numbered and accurately described.

Each establishment on consecutive lakes was then inspected with regard to: type of disposal system, location and design, soil type in area of all tile beds, presence of leaching pits or privies; to provide data on nature and depth of soil, source of drinking water and other related factors.

A preliminary classification of all waste disposal systems was made by the students prior to turning over the file to their supervisor for final classification.

One additional student was assigned to the field office located at Baker's Bay Resort on Kasshabog Lake, where she undertook typing and filing duties, along with answering enquiries from the general public either over the phone or directly. An additional student with previous experience on the Program was designated an Assistant to the Abatement Officer, conducting re-inspections and dealing with cottagers who required corrections to their systems.

Classification of Sewage Disposal Systems

All premises surveyed were classified into one of the following groups:

1. SATISFACTORY - A system which meets all current standards of good design, construction and location, and is properly maintained.

2. SATISFACTORY (ACCEPTABLE) PERFORMANCE - A system which may not quite meet current standards of design and construction but is properly located with respect to lake, well, etc., and maintained in good condition.

3. SERIOUSLY SUBSTANDARD - A system which does not meet current standards of design, construction, and location and/or is in a state of neglect. The owner is notified of the deficiency and he is advised that consideration should be given to up-dating the system in the near future. Although this system is not deemed to be causing pollution at the time of inspection, a potential hazard exists.

4. NUISANCE (WASH WATER) - A system causing wash water to be exposed on the surface of the ground either directly through a waste pipe or escaping from a seepage pit or just thrown on ground surface. Wash water discharged from any sanitary fixture is contaminated and creates an unhealthy environment. Phosphates and other nutrients

from waste discharges encourage weed growth and affect the aesthetic quality of the lake.

5. NUISANCE (TOILET AND SOLID WASTE) - A system causing a waste containing faecal or urinary discharges to be exposed on the surface of the ground, either directly through a pipe or escaping from some part of a sewage disposal system including a privy. Also, included in this classification, is "solid waste" or garbage of a kind which can cause a "nuisance", e.g. domestic garbage containing foodstuff.

6. DIRECT POLLUTER - A system which is permitting sewage to contaminate the ground water, or to reach the lake either by direct discharge through a pipe or ditch or over the ground surface.

7. UNCLASSIFIED (TEMPORARILY) - A system which has been given a preliminary classification by the student inspector where he feels he cannot assign any of the preceding classifications and has doubts about the system or part of it. These systems require further inspections by the supervisor who will attempt to make a final classification after a thorough investigation.

8. UNCLASSIFIED - A system where it is still not possible at the end of the survey to make a classification. Usually these amount to only a few and include abandoned or ruinous premises.

WATER SAMPLING

The Public Health Laboratories in Peterborough provided the necessary water sample analyses to detect Total and Faecal coliforms in the lake water samples. These samples were important for the tracing of sources of pollution entering the lake. They were not taken in sufficient number of frequency to investigate the overall water quality of the lakes surveyed.

During the cottage survey, drinking water samples were obtained when the owner was using an untreated water supply. These samples were analyzed at the Public Health Laboratory and all owners having drinking water samples taken, were immediately informed by mail of the results and instructions were also sent regarding procedures for disinfecting the drinking water supply, if found unsatisfactory. Of 218 drinking water samples taken, 59 or 27% were found unsatisfactory, that is, containing total/faecal coliforms. (Table II)

Lake water samples were taken in front of each cottage at the dock or swimming area. The Ministry's booklet "Guidelines and Criteria for Water Quality Management, July 1974", states that where ingestion is probable, recreational waters can be considered impaired when the coliform, faecal coliform and/or enterococcus geometric mean density exceeds 1000, 100, and/or 20 per 100 ml. respectively, in a series of at

least 10 samples per month, including samples collected during weekend periods.

Of 813 lake water samples taken, only 31 or 4% did not meet these criteria; these results should not be interpreted to indicate overall lake water quality, as only a single sample was obtained in front of each cottage over the entire summer season.

TABLE II

WATER SAMPLE RESULTS

1976

LAKE	LAKE WATER SAMPLES			DRINKING WATER SAMPLES		
	Total	Met Criteria	Exceeded criteria	Total	Safe	Unsafe
Kasshabog Lake	617	598	19	191	143	48
Oak Lake	115	108	7	18	10	8
Methuen Lake	81	76	5	9	6	3
TOTALS	813	96% of Total	4% of Total	218	73% of Total	27% of Total

Note: 1. All owners of establishments where drinking water samples were taken were notified by mail of analyses results.
2. The designations "Satisfactory" and "Unsatisfactory" are in accordance with the drinking water sample interpretation chart pamphlet "Understanding the Bacteriological Report on your Drinking Water", produced by the Ontario Ministry of Health.
3. No drinking water sample was taken if drinking water was being treated or brought from a municipal supply.
4. It should be noted that above Lake Water results were obtained from a single sampling only.

ABATEMENT & CORRECTION PROCEDURE

Once the inspection crew completes the data form and sketch for a cottage premises, assigning a classification, the file is examined by the supervisor, and the original classification confirmed. The abatement officer then interviews the establishment owner where a problem has been found to advise him of the findings and discuss corrective action. If the owner agrees with the findings, a corrective program is initiated and the owner signs an abatement agreement form stating the corrections which would be completed by a specific date. A final inspection is carried out upon completion of the corrective work, and the sewage disposal system is re-classified.

In the case of commercial establishments, this procedure is often more complicated requiring an engineering study and the submission of plans for approval with soils analysis report. In these instances, unless he is a direct polluter, the owner is contacted and is instructed to submit plans for the corrective measures to be completed prior to the opening of the next commercial season. A direct polluter must take corrective action immediately to prevent pollution of the lake.

METHODS OF SEWAGE DISPOSAL

Much of the shoreline property in the Kawarthas has minimal soil cover over bedrock and thus is unsuitable, in its natural state, for sub-surface sewage disposal. This can be remedied in some areas by importing granular material over an area capable of supporting a sub-surface sewage disposal system. The use of a holding tank may provide a more economical solution for the disposal of sewage and may be recommended if a contract for the pump-out of the tank can be secured. On some lots where there is restricted space for a sewage disposal system, the installation of a proprietary aerobic sewage treatment system may provide a viable alternative.

Recently there have been many developments in sewage disposal systems and the Ministry of the Environment is continually monitoring new systems being marketed in Ontario.

The Health Unit administering the septic tank program for the Ministry in the area must be consulted and approval obtained before any sewage disposal system is installed, altered, repaired or enlarged.

KASSHABOG LAKE

Kasshabog Lake, referred to locally as Kosh Lake, is situated in Methuen Township, in Peterborough County.

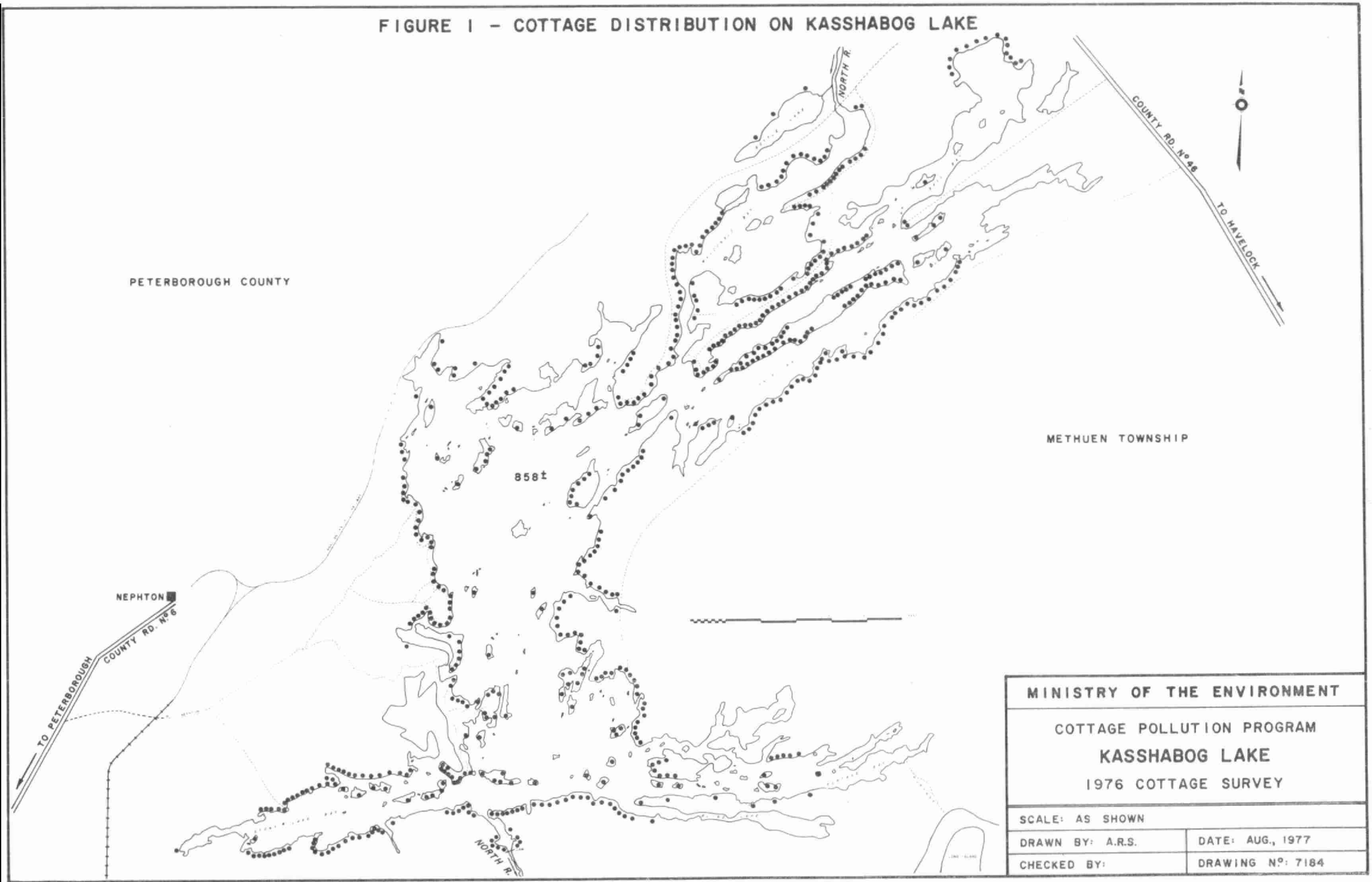
A typical Shield lake, its shoreline is very rocky. The lake is approximately 6 miles in length, with numerous bays, peninsulas and islands. Shoreline length is approximately 47 miles, with islands accounting for another 23 miles. Total surface area is 2,201 acres, with maximum depth being about 80 feet; mean depth is 14 feet.

The North River is the main inlet in the north as well as the main outlet in the south. A dam, constructed in 1948, raised the original water level by 4 feet. Although the water level can fluctuate 2½ - 5 feet/year from draw-down, the summer holding level is controlled at about 858 ft. above sea level or at about 8.5 on the gauge located at the dam.

The southern portion of the lake has a very rocky shoreline and bottom, with the north-eastern portion giving way to sandy shoreline and muddy bottom in bays. Soil overburden is very shallow in the entire area, with only occasional deep pockets in the north-eastern section.

Although some shallow bays are weed-infested with such varieties as pondweed, wild celery, yellow water lily, coontail or pickerel weed, nuisance weeds such as milfoil, were not found during the survey.

FIGURE I - COTTAGE DISTRIBUTION ON KASSHABOG LAKE



MINISTRY OF THE ENVIRONMENT	
COTTAGE POLLUTION PROGRAM KASSHABOG LAKE 1976 COTTAGE SURVEY	
SCALE: AS SHOWN	
DRAWN BY: A.R.S.	DATE: AUG., 1977
CHECKED BY:	DRAWING No: 7184

587 establishments were inspected on the lake, 135 of these were on islands; guest cabins, resort cottages, etc. brought the total to 645 sewage systems checked. There were three marinas inspected, as well as two cottage resort establishments. Out of the 645 systems inspected, only 81 or 12.8% were Satisfactory; 234 others or 36.9% were Substandard; 220 or 34.6% were wash water Nuisances, while 58 or 9.1% were solid waste or toilet Nuisances; only 17 systems or 2.7% were found to be polluting the ground water or lake as Polluters, while 25 or 3.9% remained unclassified at the time of inspection.

There were a total of 617 lake water samples taken for analysis, of which 598 or 96% were within the Ministry criteria for recreational use. A further 191 drinking water samples from cottage taps were analyzed, of which 143 or 73% were free of coliforms and safe for drinking. All cottagers where a drinking water sample was taken, were notified by mail of the results, as soon as the analyses were completed.

Water Quality - Kasshabog Lake

Although some periodic sampling has been undertaken by cottagers in recent years on a limited basis, no meaningful bacteriological survey has been carried out.

Similarly, no official results are tabulated for chlorophyl a - Secchi disc information on Kasshabog, although some sampling was apparently undertaken in 1975.

OAK LAKE

Oak Lake is situated near the south boundary of Methuen Township, in the County of Peterborough. Being another Shield lake, it is characterized by surrounding bare rock ridges with shallow-moderate depth till overburden. The east side of the lake adjoins a limestone plain with some outcrops of limestone bedrock occurring along with some granite along this shoreline.

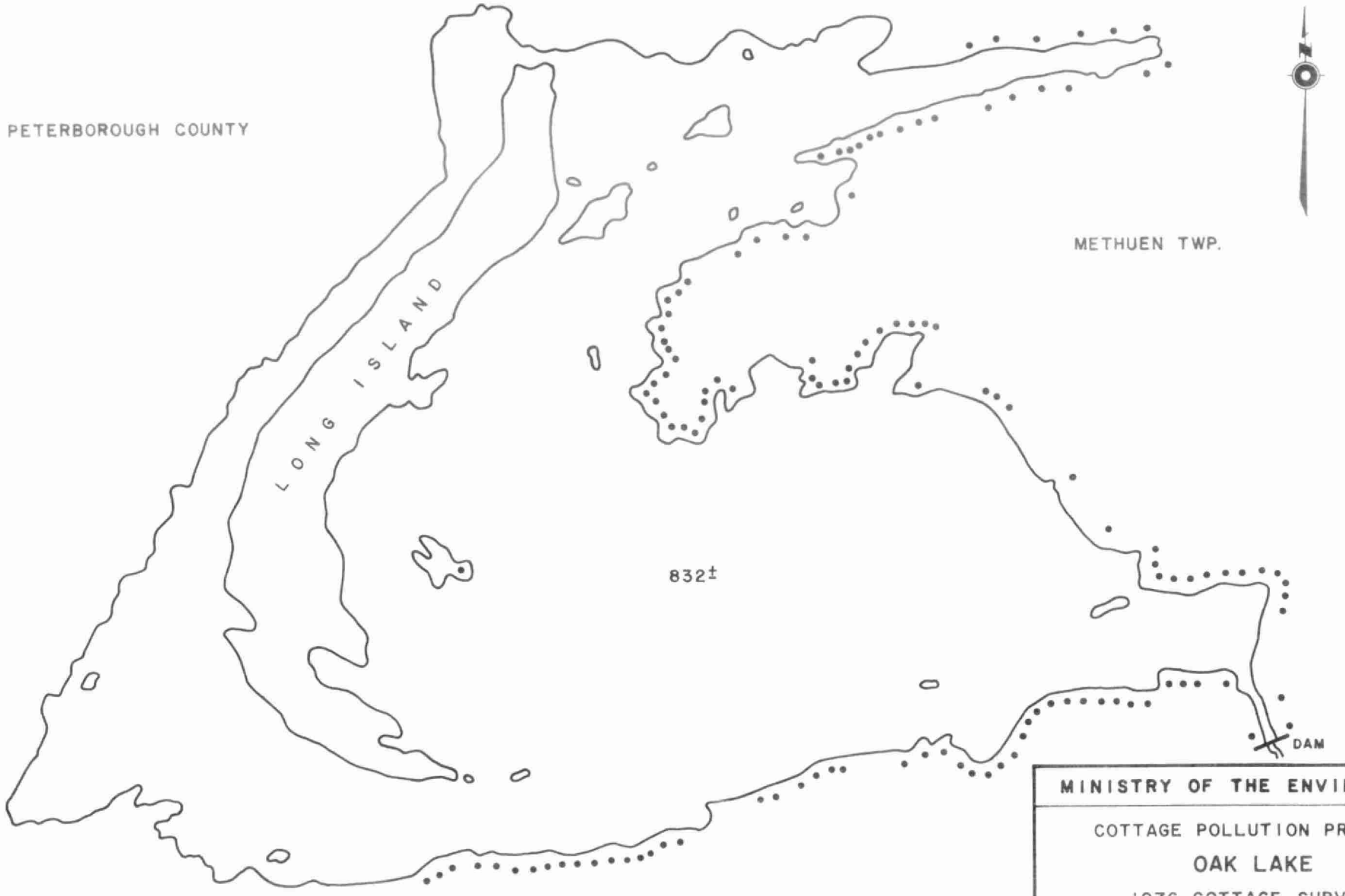
Oak Lake is about 1½ miles across at its widest point, comprising about 650 acres in area; elevation is about 832 feet above sea level. There are no major inlets, and only one outlet, on the south shore. A small man-made rock dam keeps the lake level reasonably static.

Maximum depth is about 80 feet with mean depth being about 20 feet. Except for a few pondweed varieties in bays, the lake is generally weed-free.

There are 115 cottages on Oak Lake, only one of which is on an island; there is 1 cottage resort establishment; there are no marinas.

A total of 136 sewage systems were inspected on the lake, with 43 or 31.6% being found Satisfactory; 37 systems or 27.2% were Substandard; 39 systems or 28.7% were wash waste Nuisances, while 10 systems or 7.4% were solid waste or toilet Nuisances; 6 systems or 4.4% were found

FIGURE 2 - COTTAGE DISTRIBUTION ON OAK LAKE



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SCALE: AS SHOWN	
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CHECKED BY:	DRAWING Nº: 7186

to be Polluters, mainly ground water problems. Only 1 system or 0.7% was unclassified at the time of the survey.

A total of 115 lake water samples were taken for analysis; of these, 108 or 96% were found safe for recreational uses i.e. not more than 1,000 Total, nor more than 100 Faecal coliforms. Of 18 drinking water samples obtained from cottage taps, 10 or 73% were safe to drink i.e. no Total or Faecal coliforms present. Owners where drinking water samples were taken were notified of the results by mail.

Water Quality - Oak Lake

During 1972 and 1973, extensive water sampling was undertaken by concerned cottagers on Oak Lake.

Bacteriological water samples were collected from 30 sampling stations around the lake, in 1972. In 1973, 20 sampling stations were utilized. After analysis, a geometric mean was calculated for both years' programs; the overall mean bacterial levels were 54 TC/100 ml. and 3 FC/100 ml. in 1972 and somewhat lower in 1973 with 19 TC/100. and 1 FC/100 ml. These results indicate very good bacteriological water quality, well within limits set by the Ministry for recreational use.

A relationship has been defined between Secchi-disc measurements and chlorophyll a concentration by Ministry scientists.

Nutrient poor lakes generally have clear water (Secchi disc measurements of 5 m. or more) and low algal densities (chlorophyll a concentrations of 2 mg/l or less). Nutrient rich lakes are characterized by more turbid waters (Secchi disc less than 3 m) and high algal densities (chlorophyll a 4 mg/l or more). Using the average Secchi disc measurement and chlorophyll a concentration the enrichment status of a lake can be established relative to other lakes.

During 1973 Secchi disc measurements and samples for chlorophyll a analysis were collected by the cottagers on Oak Lake, under the Ministry's Self Help Program, to determine the enrichment status of the lake. Secchi disc measurements ranged between 3.9 and 5.9 m. averaging 4.7 m. Suspended algae densities as indicated by chlorophyll a concentration reached a maximum of 2.9 mg/l and averaged 1.4 mg/l during the sampling period.

Oak Lake was characterized by good water clarity and favourably low algal densities. The enrichment status of the lake would be considered nutrient poor and similar to other lakes with good water quality (for example: Cameron Lake, Belmont Lake, Haliburton Lake).

METHUEN LAKE

Methuen Lake is situated in the north-east portion of Methuen Township, in the County of Peterborough. 925 feet above sea level, and a typical Precambrian Shield lake, it is surrounded completely by heavily wooded barren rock ridges and poorly drained pockets of muskeg and swamp. Soil cover is very shallow, being quite a coarse sand where it does occur.

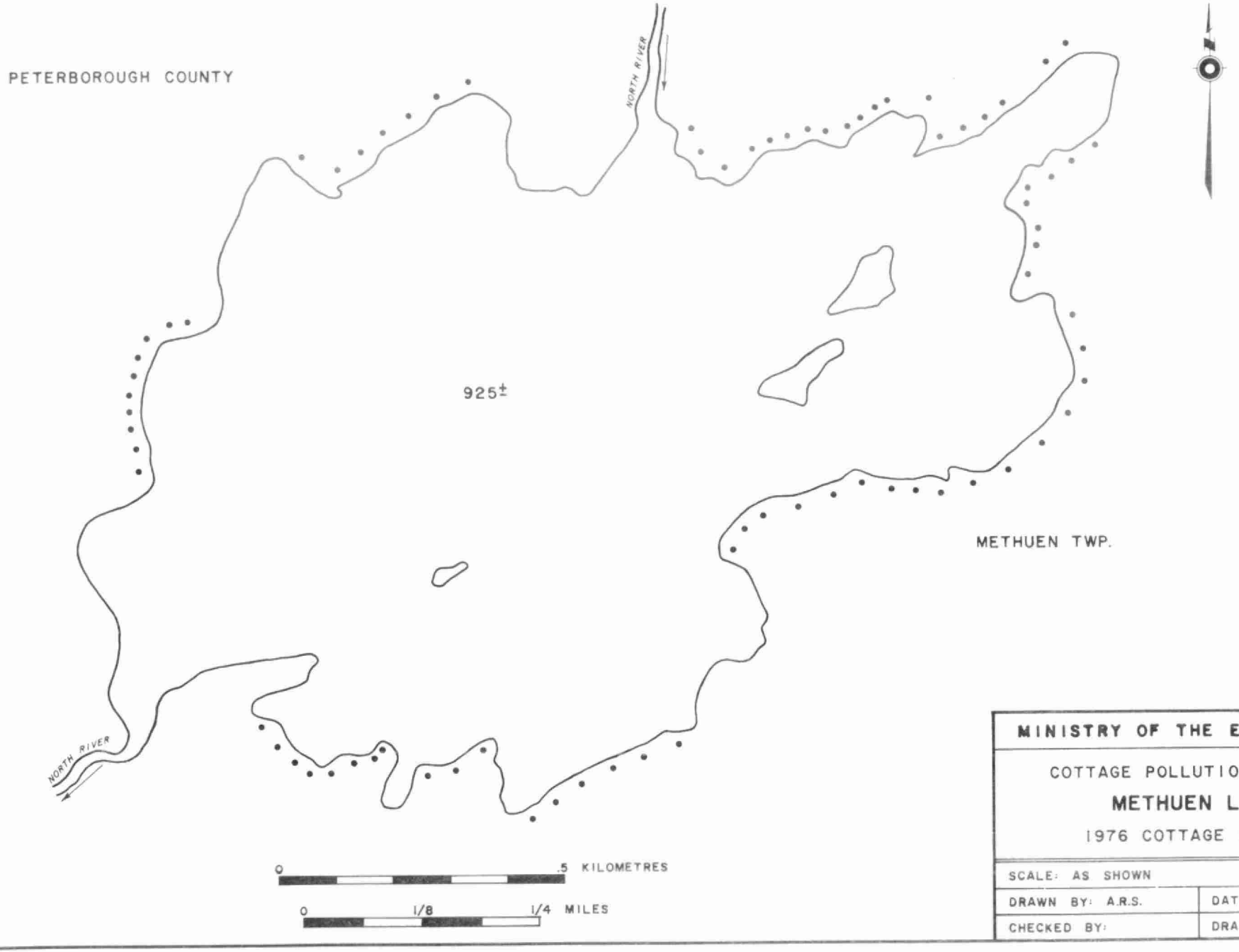
The North River, nearly at its headwaters at this point, enters Methuen on the north side, and flows out at the south-west portion; there is no man-made dam, but levels are maintained by both a natural rock spillway augmented by beaver dams at various times and locations, particularly where the river passes through a culvert under a road just downstream from the lake.

Total shoreline is about 5 miles, including approximately ½ mile of island shoreline. Maximum water depth is about 40 feet. The lake is generally weed-free with only a few emergent species present and pickerel weed.

There are a total of 77 cottage establishments on Methuen Lake, only one of which is on an island. There is no commercial development on the lake.

A total of 84 sewage disposal systems were inspected. Of these, 12 or 14.3% were Satisfactory; 29 or 34.5% were

FIGURE 3 - COTTAGE DISTRIBUTION ON METHUEN LAKE



MINISTRY OF THE ENVIRONMENT	
COTTAGE POLLUTION PROGRAM **METHUEN LAKE** 1976 COTTAGE SURVEY	
SCALE: AS SHOWN	
DRAWN BY: A.R.S.	DATE: AUG., 1977
CHECKED BY:	DRAWING N°: 7185

Substandard; 27 or 32.1% were wash water Nuisances while 7 or 8.3% were solid waste or toilet Nuisances. 6 systems, or 7.2% of the total were found to be Polluters, mostly water table problems; 3 systems or 3.6% were unclassified at the time of the survey.

Lake water samples, a total of 81 in all, were taken for laboratory analysis. Of these, 76 or 96% were within M.O.E. criteria for recreational use.

Only 9 water samples were taken for analysis from cottages with drinking water on tap; of these, 6 or 73% were safe to drink (no Total or Faecal Coliforms present).

Water Quality - Methuen Lake

Bacteriological water sampling has been carried out by cottagers in the past few years. There has not been any organized continued sampling program however, so no trends could be determined. Sample results to date do indicate a very good water quality and well within Ministry guidelines for recreational use.

In 1974 and 1975, a Self-Help survey of chlorophyll a - Secchi disc sampling was carried out on Methuen. Unfortunately the sampling was undertaken late in the summer only,

and so insufficient data was collected to allow any meaningful conclusions to be reached. The two samplings, however, did indicate low algal densities and good water clarity. The sampling program has been on-going, and in 1976 further samples have shown Secchi-disc readings to remain constant, whereas the chlorophyll *a* concentration decreased during the sampling period. Continued participation in the program is necessary to determine if this indicates a change in lake quality, or is merely due to natural variation. On the basis of 1976 results Methuen Lake was nutrient poor and had a similar enrichment status to Oak Lake.

FOLLOW-UP ABATEMENT

On the three lakes surveyed, 45.6% of all systems checked required some corrections whether minor like a leaching pit installation or privy relocation to major undertakings such as complete septic system installations. 390 systems in all, required correction; by the end of the summer, 270 signed agreements had been secured from cottagers to do corrections by one permanent Ministry Abatement Officer and an assistant working under his supervision. From these agreements, 190 systems had been corrected and reclassified by Fall; the balance of agreements were to become due in 1977.

During the winter months, Ministry staff conducted interviews in Toronto, Oshawa, and Peterborough; an additional 62 agreements were secured for corrections falling due in the summer of 1977.

Approximately 58 cottagers remained to be contacted during the summer of 1977 for necessary corrections. Field revisits during that period are expected to reach all those premises where corrections are necessary.

It is interesting to note that to secure the 270 agreements, as well as to follow-up on the 190 final inspections during the Summer and Fall, a total of 709 abatement visits were necessary. Absentee cottagers during the initial contact stage of abatement, together with final inspection revisits

necessitated by cottagers slow to complete construction by the specified time, all added up to a heavy workload for abatement staff.

INFORMATION OF GENERAL INTEREST TO COTTAGERS

MICROBIOLOGY OF WATER

For the sake of simplicity, the micro-organisms in water can be divided into two groups: the bacteria that thrive in the lake environment and make up the natural bacterial flora; and the disease-causing micro-organisms, called pathogens, that have acquired the capacity to infect human tissues.

The "pathogens" are generally introduced to the aquatic environment by raw or inadequately treated sewage, although a few are found naturally in the soil. The presence of these bacteria does not change the appearance of the water but poses an immediate public health hazard if the water is used for drinking or swimming. The health hazard does not necessarily mean that the water user will contract serious waterborn infections such as typhoid fever, polio or hepatitis, but he may catch less serious infections of gastro-enteritis (sometimes called stomach flu), dysentery or diarrhea.

Included in these minor afflictions are eye, ear and throat infections that swimmers encounter every year and the more insidious but seldom diagnosed, subclinical infections usually associated with several waterborn viruses.

These viral infections leave a person not feeling well enough to enjoy holidaying although not bedridden. This

type of microbial pollution can be remedied by preventing wastes from reaching the lake and water quality will return to satisfactory conditions within a relatively short time (approximately 1 year) since disease causing bacteria usually do not thrive in an aquatic environment.

The rest of the bacteria live and thrive within the lake environment. These organisms are the instruments of biodegradation. Any organic matter in the lake will be used as food by these organisms and will give rise, in turn to subsequent increases in their numbers. Natural organic matter as well as that from sewage, kitchen wastes, oil and gasoline are readily attacked by these lake bacteria. Unfortunately, biodegradation of organic wastes by organisms uses correspondingly large amounts of the dissolved oxygen. If the organic matter content of the lake gets high enough, these bacteria will deplete the dissolved oxygen supply in the bottom waters and threaten the survival of many deep water fish species.

RAINFALL AND BACTERIA

The "Rainfall Effect" relates to a phenomenon that has been documented in previous surveys of the recreational lakes. Heavy precipitation has been shown to flush the land area around the lake and the subsequent runoff will carry available contaminants including sewage organisms as well as natural soil bacteria with it into the water.

Total coliforms, faecal coliforms and faecal streptococci, as well as other bacteria and viruses which inhabit human waste disposal systems, can be washed into the lake. In Pre-Cambrian areas where there is inadequate soil cover and in fractured limestone areas where fissures in the rocks provide access to the lake, this phenomenon is particularly evident.

Melting snow provides the same transportation function for bacteria, especially in an agricultural area where manure spreading is carried out in the winter on top of the snow.

Previous data from sampling points situated 50 to 100 feet from shore indicate that contamination from shore generally shows up within 12 to 43 hours after a heavy rainfall.

WATER TREATMENT

Lake and river water is open to contamination by man, animals and birds (all of which can be carriers of disease); consequently, NO SURFACE WATER MAY BE CONSIDERED SAFE FOR HUMAN CONSUMPTION without prior treatment, including disinfection. Disinfection is especially critical if coliforms have been shown to be present.

Disinfection can be achieved by:

a) Boiling

Boil the water for a minimum of five minutes to destroy the disease-causing organisms.

b) Chlorination using a household bleach containing 4 to 5.1/4% Available Chlorine

Eight drops of a household bleach solution should be mixed with one gallon of water and allowed to stand for 15 minutes before drinking.

c) Continuous Chlorination

For continuous water disinfection, a small domestic hypochlorinator (sometimes coupled with activated charcoal filters) can be obtained from a local plumber or water equipment supplier.

d) Well Water Treatment

Well water can be disinfected using a household bleach (assuming strength at 5% available chlorine) if the depth of water and diameter of the well are known.

CHLORINE BLEACH

per 10 ft. depth of water

Diameter of Well Casing in Inches	One to Ten Coliforms	More than Ten Coliforms
4	.5 oz.	1 oz.
6	1 oz.	2 oz.
8	2 oz.	4 oz.
12	4 oz.	8 oz.
16	7 oz.	14 oz.
20	11 oz.	22 oz.
24	16 oz.	31 oz.
30	25 oz.	49 oz.
36	35 oz.	70 oz.

Note: Allow about six hours of contact time before using the water.

Another bacteriological sample should be taken after one week of use.

Water sources (spring, lake, well, etc.) should be inspected for possible contamination routes (surface soil, runoff following rain and seepage from domestic waste disposal sites). Attempts at disinfecting the water alone without removing the source of contamination will not supply bacteriologically safe water on a continuing basis.

There are several types of low cost filters (ceramic, paper, carbon, diatomaceous earth sometimes impregnated with silver, etc.) that can be easily installed on taps or in water lines. These may be useful to remove particles if water is periodically turbid and are usually very successful. Filters, however, do not disinfect water but may reduce bacterial numbers. For safety, chlorination of filtered water is recommended.

SEPTIC TANK INSTALLATIONS

In Ontario, provincial law requires under Part 7 of the Environmental Protection Act that before you extend, alter, enlarge or establish any building where a sewage system will be used, a Certificate of Approval must be obtained from the Ministry of the Environment or its representatives. The local municipality or Health Unit may be delegated the authority to issue the Certificate of Approval. Any other pertinent information such as size, types and location of septic tanks and tile fields can also be obtained from the same authority.

General Guidelines

A septic tank should not be closer than:

- 50 feet to any well, lake stream, pond, spring, river or reservoir
- 5 feet to any building
- 10 feet to any property boundary.

The tile field should not be closer than:

- 100 feet to the nearest dug well
- 50 feet to a drilled well which has a casing to 25 feet below the ground.
- 25 feet to a building with a basement that has a floor below the level of the tile in the tile bed.
- 10 feet to any other building
- 10 feet to a property boundary
- 50 feet to any lake, stream, pond, spring, river or reservoir.

The ideal location for a tile field is in a well drained, sandy loam soil remote from any wells or other drinking water sources.

For the tile field to work satisfactorily, there should be at least 3 feet of soil between the bottom of the weeping tile trenches and the top of the ground water table or bedrock.

Recognizing that private sewage systems are relatively inefficient where shallow and inappropriate soil conditions are present (e.g. Pre-Cambrian areas), the Ministry of the Environment is conducting research into alternate methods of private sewage disposal in un-sewered areas; into the improvement of existing equipment and methods of design and operation for these systems; and into the development of better surveillance methods such as by the use of chemical, biological and radioactive tracers to detect the movement of pollutants through the soil mantle.

DYE TESTING OF SEPTIC TANK SYSTEMS

There is considerable interest amont cottage owners to dye test their sewage systems, however, several problems are associated with dye testing. Dye would not be visible to the eye from a system that has a fairly direct connection to the lake. Thus, if a cottager dye-tested his system and no dye was visible in the lake, he would assume that his system is satisfactory, which might not be the case.

A low concentration of dye is not visible and therefore expensive equipment such as a fluorometer is required. Only qualified people with adequate equipment are capable

of assessing a sewage system by using dye. In any case, it is likely that some of the water from a septic tank will eventually reach the lake. The important question is whether all contaminants including nutrients have been removed before it reaches the lake. To answer this question special knowledge of the system, soil depth and composition, underground geology of the region and the shape and flow of the shifting water table are required. Therefore, we recommend that this type of study should be performed only by qualified professionals.

BOATING REGULATIONS

In order to help protect the lakes and rivers of Ontario from pollution, it is required by law that sewage (including garbage) from all pleasure craft, including houseboats must be retained in equipment of a type approved by the Ministry of the Environment. Equipment which will be approved by the Ministry of the Environment includes: (1) retention devices with or without circulation which retain all toilet wastes for disposal ashore, and (2) incinerating devices which reduce all sewage to ash.

To be approved, equipment shall:

1. be non-portable
2. be constructed of structurally sound material
3. have adequate capacity for expected use
4. be properly installed
5. in the case of storage devices, be equipped with the

necessary pipes and fittings conveniently located for pump-out by shore-based facilities (although not specified, a pump-out deck fitting with 1½ inch National Pipe Thread is commonly used).

An Ontario regulation requires that marinas and yacht clubs provide or arrange pump-out service for the customers and members who have toilet-equipped boats. In addition, all marinas and yacht clubs must provide litter containers that can be conveniently used by occupants of pleasure boats.

The following "tips" may be of assistance to you in regard to boating:

1. Motors should be in good mechanical condition and properly tuned.
2. When a tank for outboard motor testing is used, the contents should not be emptied into the water.
3. If the bilge is cleaned, the waste material must not be dumped into the water.
4. Fuel tanks must not be overfilled and space must be left for expansion if the fuel warms up.
5. Vent pipes should not be obstructed and fuel needs to be dispensed at a correct rate to prevent "blow-back".
6. Empty oil cans must be deposited in a leak-proof receptacle, and
7. Slow down and save fuel.

PHOSPHORUS AND DETERGENTS

Scientists have recognized that phosphorus is the key nutrient in stimulating algae and plant growth in lakes and streams.

In the past years, approximately 50% of the phosphorus

contributed by municipal sewage was added by detergents. Federal regulations reduced the phosphate content of P_2O_5 in laundry detergents from approximately 50% to 20% on August 1, 1970, and to 5% on January 1, 1973.

It should be recognized that automatic dishwashing compounds were not subject to the government regulations and that surprisingly high numbers of automatic dishwashers are present in resort areas (a questionnaire indicated that about 30 percent of the cottages in the Muskoka lakes have automatic dishwashers). Cottagers utilizing such conveniences may be contributing significant amounts of phosphorus to recreational lakes because automatic dishwashing compounds are characteristically high in phosphorus. Indeed, in most of Ontario's vacation land, the source of domestic water is soft enough to allow the exclusive use of liquid dishwashing compounds, soap and soap-flakes which are, in general, relatively low in phosphorus.

BLACKFLIES AND MOSQUITOES

These are the most bothersome, biting insects in the cottage country. Mosquitoes breed in any kind of standing water whether a roadside ditch, unemptied pails of rainwater, flat roofs or swampy areas. The simplest method for controlling mosquito larvae is making sure that all standing water in any kind of receptacle around the cottage is kept empty. The property should be laid out so that water standing in ditches is kept running, by careful drainage

planning. Swimming pools should be properly filtered and chlorinated, and eavestroughs should be kept clear of leaves. Low depressed areas that might fill with water should be filled in. In the garden areas and lawns, regular mowing of weeds and grass, trimming hedges and removing unnecessary shrubbery will help remove wind and sun protection from adult mosquitoes. To minimize bites, make sure any holes in screening are repaired, and make sure the screens are tightly sealed. Restrict outdoor activities in the evenings if at all possible, and keep the damper on your fireplace closed.

Lighter coloured clothing is less attractive to a hungry mosquito and if you're working or visiting in areas where the mosquito population is heavy, make sure to wear loose protective clothing such as long sleeved shirt, light jacket, slacks and socks. Mosquitoes are particularly bothersome at night and in dark wooded areas, during the day, so take the proper precautions and you'll suffer less.

Repellents are available in both liquid or stick form. Read the instructions carefully before using and be careful not to get the material in your eyes or mouth. The types that contain a higher concentration (in percentage) of the active ingredient will do a better job.

Blackflies are particularly bothersome in the early weeks of summer. They breed in fast-flowing watercourses so the best method of fighting them is by larviciding over a large

area. This kind of project is best managed by a community or provincial government agency. Fogging or pesticidal spraying over a large area will have temporary benefits but the practice does not justify the hazard of contamination of nearby water bodies. Complete eradication of biting fly populations can never be realized, and real control is not possible because of the limitation of funds and a lack of sufficient trained personnel. Individual landowners may operate their own larviciding in small areas (swamps, standing water and rain pools adjacent to cottages) but it should be remembered that permits are required where the program might affect adjacent streams or lakes.

The permit must be obtained from the Pesticides Control Section, Ministry of the Environment, 1 St. Clair Ave. West, Toronto, Ontario M4V 1P5.

AQUATIC PLANT CONTROL

Many shallow lakes, such as those in the Kawartha district, provide ideal conditions for aquatic plants. These lakes are warm in summer and the profuse plant life provides an excellent habitat for sport fish species. Unfortunately, the plants pose a problem when man attempts to use the lakes for recreation. These lakes may be quite healthy, but the plants are only a "problem" when man wants to make specific use of the water.

Complete removal of the plant life is not desirable since it is important for good fishing. Some management technique is needed that will satisfy the needs of boaters, fishermen and swimmers, but that also will maintain the lake's healthy state.

PLANT HARVESTING

Mechanical harvesting has shown to be applicable to the Kawartha situation. Ministry of the Environment experiments in Chemung Lake in 1976 covered more than 1,000 acres of the lake. The fish were there, but the fisherman could not get to them because of the heavy plant growth.

Plant harvesting is a good example of a technique which satisfies man's requirements and still protects or even improves the natural lake conditions.

THE A.I.D. METHOD

Many lakes become low in oxygen in bottom waters during the summer. This results in decreased chemical quality and a loss of fish habitats. AID is simply a mechanical means of keeping the waters well mixed, thereby assuring a good distribution of oxygen in all parts of the lake. The method used experimentally by the Ministry of the Environment consisted of a shore-located compressor pumping air through a long perforated tube along the lake bottom. The bubble action caused the waters to "turn over", aerating the water.

The benefits are:

- improved chemical quality
- decrease in algae
- increased water clarity
- improved fish habitat
- reversed eutrophication effects

Trout fisheries have been restored in two experimental lakes and the techniques have been applied in at least three cases to solve particular problems.

- Heart Lake for algae control
- Valens Reservoir for algae control
- Scotch Block Reservoir for chemical water quality control

The AID method is one of the safest, cheapest and most effective lake management techniques available.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